REMARKS/ARGUMENTS

Applicant thanks the Examiner for the thorough consideration given the present application. Claims 1-20 are pending in the present application. Claims 1-5 and 7 have been amended. Claims 8-20 are new. Claim 1 and 12 are independent.

Claim for Priority

It is gratefully acknowledged that the Examiner has recognized the Applicant's claim for foreign priority. In view of the fact that the Applicant's claim for foreign priority has been perfected, no additional action is required from the Applicants at this time.

Specification

The Examiner has objected to the Specification and requires a Substitute Specification using proper idiomatic English in compliance with 37 C.F.R. 1.52(a) and (b). Accordingly, a Substitute Specification is being filed concurrently herewith. Applicant respectfully submits that the Substitute Specification is in proper idiomatic English, and meets the requirements of 37 C.F.R. 1.52. Applicant further submits that the Substitute Specification

includes no new matter with respect to the originally filed Specification.

Additionally, the Examiner objected to the Title of the Specification as not being descriptive. Accordingly, the Substitute Specification includes a new Title, "IMAGE FILE APPARATUS AND METHOD FOR STORING DISPLAY IMAGE DATA CORRESPONGING TO A DISPLAY SIZE." Applicant respectfully submits that this Title is clearly indicative of the invention and the claims.

Claim Objections

The Examiner objected to claims 2 and 3 because the phrase "is built in" allegedly gives the impression that the feature being described is actually manufactured inside the feature that follows. Applicant presumes that the Examiner intended to object to claims 2 and 4, which contain this phrase. In the above amendments, Applicant has replaced "is built in" with "is built into" in claims 2 and 4. Accordingly, Applicant respectfully requests withdrawal of this objection.

Drawings

The Examiner has objected to the drawings because the contents of decision block S20 in Figure 2 and decision block S54 in Figure 3 are not improper idiomatic English. Accordingly, corrected sheets of Formal Drawings are attached in which revisions have been made to blocks S20 and S54 in Figures 2 and 3, respectively. In addition, annotated sheets of drawings are attached in which these changes are clearly indicated in red ink. Applicant respectfully submits that no new matter has been added to the application by these drawing changes. In view of these changes, withdrawal of this objection is respectfully requested.

Rejection Under 35 U.S.C. § 103

Claims 1, 2, 6 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,1137,534 to Anderson (hereinafter Anderson). This rejection, insofar as it pertains to the presently pending claims, is respectfully traversed.

M.P.E.P. § 2143.03 sets forth the following requirements for a proper rejection under 35 U.S.C. § 103:

> "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)."

Applicant respectfully submits that the prior art fails to provide a teaching or suggestion of all of the features in the claimed invention.

As amended, claim 1 recites "determine[ing] whether conversion of the original image data is necessary based on a size of the original image data and a display size corresponding to a display, and if conversion is determined to be necessary, convert[ing] the original image data ... into display image data in the display size of the display." Applicant respectfully submits that Anderson fails to teach or suggest this feature.

Anderson discloses an image capture device capable of displaying captured images on and LCD screen. In particular, Anderson discloses the following two embodiments.

In the first embodiment, Anderson discloses that raw image data sequentially captured by the device is used to independently generate two types of image data: a screennail image having a reduced resolution suitable for the LCD screen (analogous to the claimed display image data); and compressed image data (analogous to the claimed

original image data). Specifically, Anderson discloses that the captured raw image data is automatically converted into a YCC format on the LCD screen in order to generate the screennail image and provide a live view for the user. See Anderson at column 7: lines 6-30.

In the second embodiment, Anderson discloses a two-stage process. In the first stage, raw image data is captured to a frame buffer and compressed before being stored in the input buffers. In a second stage, the compressed image data is automatically converted into YCC data used for generating the screennail image for the live view of the LCD screen. See Anderson at column 8: lines 1-14.

In both the first and second embodiments of Anderson, display image data (i.e., screennail image) is automatically generated and displayed on the LCD screen to provide the user a live view. According to Anderson, the user uses this live view to determine which image will be captured for storage by pressing the shutter button (see Anderson at column 7: lines 22-30).

Accordingly, Applicant respectfully submits that Anderson fails to teach or suggest making any determination whether the original image data will be converted into

display image data based on the size of the original image data and a display size, as required by independent claim 1. Instead, Anderson teaches away from this feature. Anderson specifically discloses that a conversion is automatically performed on either the raw image data or the compressed image data in order to generate a screennail image (display image data) to provide the user with a live view.

Applicant respectfully submits that independent claim 1 is not rendered obvious by Anderson at least for the reasons set forth above. Furthermore, Applicant respectfully submits that claims 2, 6, and 7 are allowable at least by virtue of their dependency on independent claim 1.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Anderson in view of U.S. Patent No. 5,153,730 to Nagasaki et al. (hereinafter Nagasaki). Applicant respectfully submits that Nagasaki fails to remedy the deficiencies of Anderson set forth above in connection with independent claim 1. Accordingly, Applicant submits that claim 3 is allowable at least by virtue of its dependency on claim 1.

Claims 4 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Anderson in view of U.S. Patent No. 5,067,029 to Takahashi. Applicant respectfully submits that Takahashi fails to provide any teaching or suggestion to remedy the deficiencies of Anderson set forth above with respect to independent claim 1. Accordingly, Applicant submits that claims 4 and 5 are allowable at least by virtue of their dependency on independent claims 1.

New Claims

Applicant respectfully submits that new claims 8-11 are allowable at least by virtue of their dependency on allowable independent claim 1. Furthermore, new independent claim 12 is a method claim reciting features similar to those in claim 1. Accordingly, Applicant submits that claim 12 is allowable for reasons similar to claim 1, and that new claims 13-20 are allowable at least by virtue of their dependency on independent claim 12.

Conclusion

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but to merely show

the state of the art, no comment need be made with respect thereto.

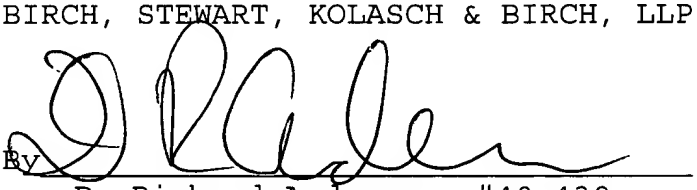
In view of the above amendments and remarks, reconsideration of the rejections and allowance of all of the claims are respectfully requested.

Should the Examiner believe that any outstanding matters remain in the present application, the Examiner is respectfully requested to contact Jason W. Rhodes (Reg. No. 47,305) at the telephone number of (703) 205-8000, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP



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amended title

IMAGE FILE APPARATUS AND METHOD FOR STORING DISPLAY IMAGE DATA CORRESPONDING TO A DISPLAY SIZE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to an image file apparatus. More particularly, this invention relates to an image file apparatus that records and stores an image, which is recorded in a recording medium by a digital camera or the like, in another recording medium.

Description of Related Art

In general, a recording medium such as a memory card for use in a digital camera is relatively expensive, and it is not economical to have a number of memory cards. To address this problem, image data recorded in the recording medium by the digital camera is stored in another recording medium having a large recording capacity (such a medium is relatively inexpensive per bit) for use in an image file apparatus.

On the other hand, the number of pixels in an imaging device in the digital camera has been increasing recently, so that image data with a large number of pixels (high resolution) can be recorded in the recording medium. In order to read the image data with a large number of pixels from the recording medium and display the entire image on a monitor such as a CRT display in accordance with the read image data, the image data is reduced and interpolated to decrease the number of the pixels therein ~~to~~ in accordance with a display size of the monitor.

If ~~an~~ image data with a large number of pixels is read from the recording medium and is reduced and interpolated to decrease the number of the pixels therein according to the display size of the monitor every time an image is displayed on the monitor, ~~it takes~~ is taken a long time ~~to access~~ due to the a large amount of data accessed. Moreover, a time

Some amount of

is needed to reduce the data and the like, ~~and therefore, it takes a long~~ time required to further adding to the amount of display the image on the monitor.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an image file apparatus, which is capable of displaying an image in accordance with image data recorded in a recording medium within a short time.

The above object can be accomplished by providing an image file apparatus comprising: a first image data reading device that reads original image data; a converting device that converts the original image data read by the first image data reading device into ~~a~~ display image data ~~in~~ a display size of a display; and an image recording device that records the original image data read by the first image data reading device into a first recording medium, and that records the display image data produced by the converting device into the first recording medium, when a size ~~of~~ the original image data is different from the display size of the display. corresponding to whose amount corresponds to

More specifically, the image file apparatus stores the original image data, and if the size ~~of~~ the original image data is different from the image data size for corresponding to displaying on the display, the image file apparatus converts the original image data into the display image data ~~by~~ using the converting device and stores the display image data at the same time as the recording of the original image data.

The original image data may be read from a second recording medium, which is built ~~in~~ into or is detachably mounted in a digital camera. The first recording medium may be built ~~in~~ into the image file apparatus, attached to the outside of the image file apparatus, or detachably mounted in the image file apparatus.

In one preferred form of the present invention, the image file apparatus

further comprises: a second image data reading device that reads the display image data from the first recording medium when the display image data has been recorded in the first recording medium, and that reads the original image data from the first recording medium when the display image data has not been recorded in the first recording medium; and a display driver that drives the display to display an image in accordance with one of the original image data and the display image data, the one of the original image data and the display image data being read by the second image data reading device.

More specifically, the original image data is stored in the first recording medium, and if the size of the original image data is different from the display size of the display, the display image data corresponding to the original image data is stored along with the original image data. Therefore, the second image reading device can read the display image data or the original image data in the same display size as the display image from the first recording medium. Thus, the display image data with a smaller amount of data is accessed instead of the original image data with a larger amount of data, and this reduces the access time. Moreover, there is no necessity of reducing or interpolating the image, and thus, the image can be displayed quickly on the display.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature of this invention, as well as other objects and advantages thereof, will be explained in the following with reference to the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures and wherein:

Fig. 1 is a block diagram showing an embodiment of an image file apparatus according to the present invention;

Fig. 2 is a flow chart ~~of assistance~~ that assists in explaining how an image is stored

in the image file apparatus in Fig. 1; and

Fig. 3 is a flow chart ~~of assistance~~ that assists in explaining how an image is regenerated in the image file apparatus in Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

This invention will be described in further detail by way of example with reference to the accompanying drawings.

Fig. 1 is a block diagram showing an image file apparatus according to an embodiment of the present invention.

As shown in Fig. 1, the image file apparatus mainly has a function for recording image data, which is stored in a recording medium 10, in another recording medium 12, and a function for displaying an image on a monitor apparatus 30 such as a CRT in accordance with image data stored in the recording medium 12. The image file apparatus comprises: drive units 14, 16; a memory controller 18 for images to be displayed; a display memory 20; a video signal output circuit 22; and a central processing unit (CPU) 24.

The recording medium 10, such as a memory card ~~and~~ or a smart medium, is used in a digital camera. The recording medium 12 (~~such as~~ e.g., a magnetic disk, an optical disk, ~~and~~ or a magneto-optical disk) has a larger recording capacity than the recording medium 10 used in the digital camera and is less expensive per bit than the recording medium 10 used in the digital camera. The recording medium 12 ~~should~~ may not always be detachably mounted in the image file apparatus, but it may also be built ~~in~~ into the image file apparatus or attached to the outside of the image file apparatus.

The drive units 14, 16, the memory controller 18 and the CPU 24 are connected through a bus 29. The bus 29 connects to a user interface 26 for inputting a variety of commands from a user and a printer interface 28 for

transferring image data and the like to a printer (not illustrated).

The CPU 24 unites and controls the circuits of the image file apparatus, and executes conversion, such as reduction and interpolation, for converting image data to decrease a large number of pixels therein to the number of pixels ~~in~~ a monitor apparatus 30 (e.g., 640×480 pixels), ~~and~~ expansion/compression of the image data. Another processing means than the CPU 24 may execute the conversion and the expansion/compression.

The drive unit 14 reads image data (original image data) recorded in the recording medium 10, and sends the original image data to the CPU 24 through the bus 29. The CPU 24 records the original image data in the recording medium 12 through the bus 29 and the drive unit 16. If the number of pixels in the original image data is larger than the number of pixels ~~in~~ the monitor apparatus 30, the original image data is converted to reduce the number of pixels therein to the number of pixels ~~in~~ the monitor apparatus 30. The converted image data (image data for display) is outputted to the memory controller 18 through the bus 29.

The memory controller 18 writes the display image data in a display memory (a video RAM) 20, and repeatedly reads the display image data stored in the display memory 20. The memory controller 18 outputs the read display image data to the video signal output circuit 22. The video signal output circuit 22 comprises a D/A converter for converting the display image data to analog signals and an NTSC encoder. The video signal output circuit 22 generates NTSC video signals from the display image data, and outputs the NTSC video signals to the monitor apparatus 30 through a video signal cable 23. Consequently, an image is displayed on the monitor apparatus 30.

The display image data is recorded in the recording medium 12 through the drive unit 16. Thus, the original image data and the display image data corresponding to the original image data are recorded in the recording medium

12. If the original image data has the same number of pixels as the monitor apparatus 30, only the original image data is recorded.

To display the image on the monitor apparatus 30 in accordance with the image data recorded in the recording medium 12, the display image data is read from the recording medium 12 and is stored in the display memory 20. If the recording medium 12 contains no display image data, the original image data is read and is stored in the display memory 20. In this case, the original image data has the same number of pixels as the display image data.

Then, the image is displayed on the monitor apparatus 30 in accordance with the image data stored in the display memory 20. More specifically, if the display image data is read from the recording medium 12 and the image is displayed according to the display image data, the ~~frequency in access can be decreased since~~ the amount of the data is small. Moreover, the image can be displayed within a short time since there is no necessity of executing the conversion such as reduction of the image data.

STET

recording medium 12 is accessed less frequently while the display image data is being read

Referring next to Figs. 2 and 3, the operation of the image file apparatus that is constructed in the above-mentioned manner will be explained.

~~When~~ The user inputs a command for storing an image through the user interface 26 by operating a switch, a remote controller, or the like (not illustrated). ~~in~~ user's command ~~waiting state~~ at step S10 in Fig. 2, a size (the numbers of pixels in vertical and horizontal directions) of the image to be recorded is read from the recording medium 10 (step S12), and the image data (the original image data) is read (steps ~~S12 and~~ S14). The image size is recorded in a header of an image file.

This occurs while the image file apparatus is waiting for the

The original image data is recorded in the recording medium 12 (step S16). The original image data, which has been compressed in a predetermined format to be recorded, is expanded (step S18).

Then, it is determined whether it is necessary to convert the original

or not

image data to reduce the number of the pixels therein to a display size, ~~or not~~ according to the image size of the original image data read at the step S12 (step S20). If it is determined that it is necessary to convert the original image data (if the number of pixels in the original image data is larger than the number of the pixels ~~in~~ of the monitor apparatus 30), the original image data is converted (e.g., reduced) to reduce the number of the pixels therein to the number of pixels ~~in~~ corresponding to the monitor apparatus 30 (step S22).

The converted image data (~~the~~ image data ~~for display~~) is compressed in a predetermined format (step S24), and ~~is~~ recorded in the recording medium 12 (step S26). The display image data converted at ~~the~~ step S22 is transferred ~~into~~ to the display memory 20 (step S28).

If it is determined that it is not necessary to convert the original image data, the original image data is transferred ~~into~~ to the display memory 20 (step S28).

The monitor apparatus 30 displays an image according to the image data ~~for display or the~~ original image data transferred into the display memory 20 (step S30), and the state returns to the user's command waiting state (step S10).

~~There will now be explained~~ the regeneration of the image according to the original image data or ~~the~~ image data ~~for display, recorded in the recording medium 12.~~

When the user inputs a command for regenerating an image through the user interface 26 as shown in Fig. 3 (step S50), an image to be regenerated is selected (step S52). The image is selected on an index image, by inputting a frame number, by displaying the next frame or the last frame, or the like.

After the image is selected, it is determined whether there is ~~the~~ image data ~~for display~~ relating to the selected image ~~or not~~ (step S54).

~~There will now be explained~~ the method of determining whether there is the image data ~~for display~~ relating to the selected image or not.

When the image data is stored in the recording medium 12, a management table file (as shown in the following TABLE 1) is produced and recorded in the recording medium 12.

TABLE 1

Management table file	(A, A'), B, (C, C'), ...

In the above management table file, (A, A') and (C, C') indicate that there ~~are the~~ is both original image data and the display image data. B indicates that there is only the original image data for another image display.

If ~~it is determined~~ that ~~there is the~~ image data ~~for display relating to~~ the image to be regenerated ~~according to the management table file~~, the image data for display is read from the recording medium 12 (step S56). If it is determined that there is no image data ~~for display~~ for display, the original image data is read from the recording medium 12 (step S58). The original image data has the same size as ~~the display size~~ that of ~~the~~ image data ~~for display~~ for display.

~~The~~ image data ~~for display or the original image data~~ read in the above-mentioned manner, ~~which has been compressed,~~ is expanded (step S60) and ~~is~~ transferred to the display memory 20 (step S62). The monitor apparatus 30 displays the image according to the image data ~~for display or the~~ original image ~~data~~ data or display image data transferred to the display memory 20 (step S64).

As stated above, the image is displayed according to ~~the~~ display image data or ~~the~~ original image data, whose data amount is small, ~~read from the recording medium 12, and~~ this decreases the frequency ~~in access at the reading~~ and eliminates the necessity of executing the conversion (e.g., reduction) of the image data. Therefore, the image can be displayed within a short time.

As shown in Fig. 1, the image file apparatus has the printer interface 28, through which the original image data is transferred from the recording medium 12 to the printer.

In this embodiment, the original image data is read from the recording

corresponding to particular images
exists for
the management table file indicates
Whichever of the original image data or display is
from its compressed state
in the recording medium 12,
at which the recording medium 12 is accessed in order to read the image data,

medium 10 and is stored in the recording medium 12. ~~but this~~ invention ~~should not be~~ restricted to this. For example, the original image data may be captured through digital communication. ~~The~~ monitor apparatus 30 is not necessarily connected to the image file apparatus with the video signal cable 23, ~~but~~ it may ~~also~~ be built ~~in~~ the image file apparatus, ~~The~~ number of pixels in the image data ~~for display~~ should not be restricted to this embodiment. Moreover, if the number of pixels in the original image data is smaller than the number of pixels in the image data for display, the number of pixels in the original image data is increased to the number of pixels ~~in the~~ image data ~~for display~~ by means of interpolation or the like.

As set forth hereinabove, the inputted original image is stored in the recording medium, and if the size of the original image is different from the display size ~~of~~ the image display means, the original image is changed into ~~the~~ display image ~~in~~ the display size of the image display means. In this case, the original image and ~~the~~ display image are stored at the same time. Therefore, in order to display the image, the ~~display image with a~~ small amount of data is accessed instead of ~~the original image with a~~ large amount of data. This reduces the access~~ing~~ time and eliminates the necessity of reducing and interpolating the image. Consequently, a desired image can be displayed on the image display means within a short time.

The display image is stored with the original image, and the display image is accessed to display the image. Thus, the original image can be backed up.

It should be understood, however, that there is no intention to limit the invention to the specific forms disclosed, but on the contrary, the invention is to cover all modifications, alternate constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

ABSTRACT OF THE DISCLOSURE

In an apparatus and method according to the present invention, ~~Original~~ image data is read, and ~~is~~ stored in a recording medium. If the size of the original image data is determined as being different from the display size of a monitor apparatus, the original image data is converted to change the size of the original image to the display size of the monitor apparatus. The converted ~~original~~ image data (display image data) is also stored in the recording medium. Therefore, ~~the display~~ image ~~or the original image in the same~~ display size ~~as the display image~~ can be read from the recording medium, ~~and this~~ ~~enables the~~ display ~~of an~~ image on a monitor apparatus ~~within a short time~~.

thus reducing the time required to the

data whose size corresponds to the

when displaying the image

FIG. 2

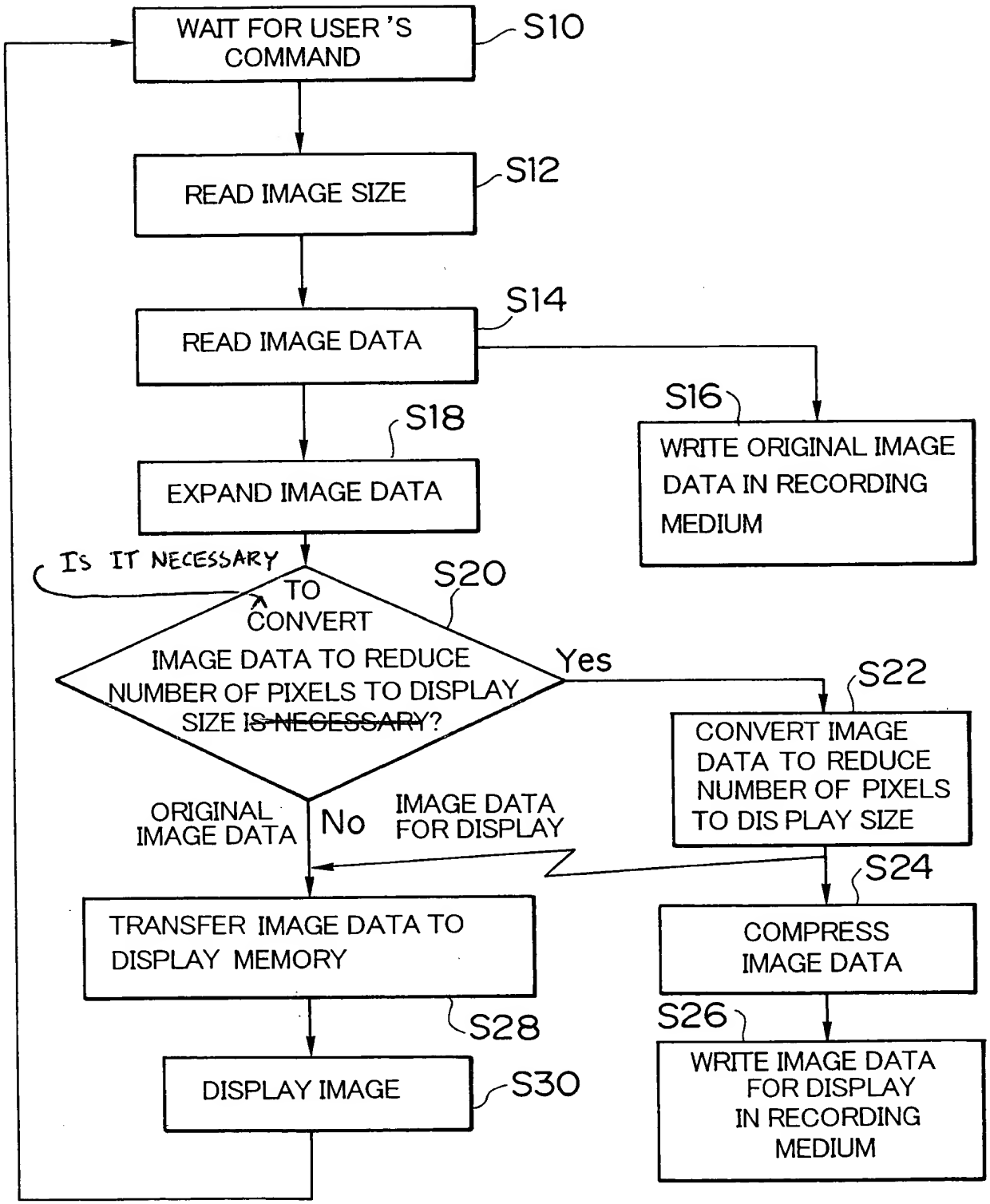

FIG. 3